

## REMARKS

Claims 1-79 are pending. Claims 1-51 have been withdrawn from consideration as being drawn to a non-elected invention. Applicants have amended claims 52, 55, 56, 58, 59, 61, 62, 67, 69, 71, 72, 73, 74, and 77 support for which may be found throughout the originally filed specification. Claim 75 has been canceled without prejudice to applicants' right to pursue the subject matter of this claim in a future continuation application. New claim 80 has been added to recite the examples of hardwood, softwood, grains, and particulates of grain which were previously listed in claim 52. Claim 77 has been amended to recite depository accession numbers for microorganisms described in the Specification on page 17, second full paragraph. Applicants have also amended the Specification at page 17, paragraph 3 to insert the CBS and ATCC accession numbers for *C. shehatae* CSIR Y492 and the ATCC accession number for *Pachysolen tannophilus* NRRL Y 2460 and at page 17, paragraph 4 to insert the names and addresses of the ATCC, NRRL and CBS, which are Budapest Treaty recognized depositories from which the recited microorganisms may be obtained, to insert "*Candida shehatae* CBS 2779" and the ATCC accession number for this microorganism, and to insert the ATCC accession number for *Debaryomyces hansenii*. These amendments are made to clarify the present invention and not intended to narrow or limit the scope of the present invention. No new matter has been added. Applicants respectfully request entry of the present amendment. Accordingly, claims 1-74 and 76-80 will be pending.

### Information Disclosure Statement

Applicants filed a Supplemental Information Disclosure Statement (IDS) on February 24, 2005 with an accompanying PTO Form 1449, which properly listed the documents to be made of record and on which were separately listed abstracts from Chemical Abstracts which had been inadvertently listed incorrectly in a previously filed IDS, so that they made be made of record. Japanese patent abstract 63219389, published September 13, 1988, which was previously listed as "JP 870309," was also listed on PTO Form 1449 for the Supplemental IDS. Applicants believe that the submission of the aforementioned Supplemental IDS obviates the inadvertent errors in Applicants' previously submitted IDS, which the Examiner pointed out in the January 18, 2005 Office Action on page 2, line 24 to page 3, line 23.

### Rejection under 35 U.S.C. §112, first paragraph

The Examiner asserts that claim 75 fails to comply with the enablement requirement. Claim 75 requires microorganisms, which must have been known and readily available to the public before the present application was filed or must be deposited in an acceptable depository and statements made assuring unrestricted availability to the public if the patent

issues. If the microorganisms were known and readily available to the public prior to the filing of the present application, this should be established by evidence. The Examiner states that microorganisms without an ATCC or NRRL number do not appear to have been deposited in a Budapest treaty recognized depository and it is uncertain how one would obtain these microorganisms since the specification fails to describe where the microorganisms can be obtained.

Applicants have canceled claim 75 without prejudice.

✓ Applicants submit a copy of pages 79, 80 and 237-238 of an American Type Culture Collection (ATCC) Catalogue of Fungi/Yeasts, Seventeenth Edition, 1987, which list the microorganisms recited in claim 77, i.e., *Candida shehatae* CBS 2779 (ATCC 60778), *Candida tropicalis* ATCC 9968, and *Pachysolen tannophilus* NRRL Y-2460 (ATCC 32691), and thereby evidence their availability to the public before the filing date of the subject application. The specification has been amended at page 17 to provide the names and addresses of the Budapest Treaty recognized depositories from which the microorganisms bearing the recited depository numbers may be obtained.

#### **Rejection under 35 U.S.C. §112, second paragraph**

Claims 52-79 have been rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

#### Claim 52

Applicants have amended claim 52 as follows:

in line 4 to delete “from” and insert “in”;

in line 6 to recite “an extracted biomass and solubles; the solubles comprising free pentoses, hexoses, pentosans, hexosans and residue; and the extracted biomass comprising hexosans, pentosans and solids”, support for which may be found in the specification as originally filed *inter alia* at page 18, lines 12 to 19;

in line 8 to remove the comma after “cellulose” and to insert “and” for a proper Markush group;

in line 10 to correct the spelling from “form” to “from”;

in line 13 to delete the duplicate comma;

in line 14 to delete “as alder, aspen, birch, beech, eucalyptus, poplar, willow and maple,” which is now recited in new claim 80 as hardwood which may be selected;

in lines 14-15 to delete “as pine and spruce, willow”, which is now recited in new claim 80 as softwood which may be selected;

in line 15 to delete “as wheat, barley, rye, rice and oat”, which is now recited in new claim 80 as grains which may be selected;

in line 16 to delete “as straw, hulls, husks,” which is now recited in new claim 80 as particulates of grain which may be selected;

in line 20 to delete “any of the preceding” and to list the preceding sources listed in claim 52 from which liquids may be derived: “wood, hardwood, softwood, plants, plants, plant constituents, grains, particulates of grain, fiber, stems, shells, corn cobs, cornstraw, corn fiber, nutshells, almond shells, coconut shells, bagasse, cotton seed bran, cotton seed skins, wood chips, sawdust, woodpulp, and processed paper”;

in line 22 to delete “mass” and insert “biomass” before “extracted”, antecedent basis for which is found in line 21 and in amended line 6, which recites “extracted biomass” as a product of the partial hydrolysis and to delete “and” and insert a comma between “pentosans” and “hexosans”;

in line 23 to insert “and hexosans,” after “soluble pentosans” support for which may be found in the specification as filed at page 18, line 15;

in lines 25, 31, and 33 to delete “hydrolyzed” before “pentoses” and “hexoses”;

in lines 28, 29, 32, 45 and 49 to delete “separated” before “biomass solution,” since the claims already recites that the hydrolyzed biomass solution is “separated” into a biomass solution and solids;

in line 35, to insert “a xylose-containing fraction, a recycle fraction”, support for which may be found in the specification as filed *inter alia* at page 18, lines 28-30;

in line 41, “xylitol” has been deleted, support for which may be found in the specification as filed *inter alia* at page 19, lines 2-4, and “and” has been deleted before “galactose” to recite a proper Markush group;

in line 48, to delete “reducing” and insert “fermenting”, support for which may be found in the specification as filed *inter alia* at page 19, lines 13-14; and

in line 52 to correct the spelling from “form” to “from.”

In response to the Examiner’s query relating to the recitation of “spent sulphite liquor” and “sulphite cooking liquor” in claims 52 and 73, applicants respectfully direct the Examiner’s attention to the specification as filed at page 11, lines 3-12, which describes both of these liquors as having a high xylan and/or xylose content thus making them a good raw material for use in the production of xylitol.

The “residue” in claim 52, line 23, finds support in amended line 6 as a product of the partial hydrolysis.

In claim 52, line 25, “hydrolyzed solids” is supported in the claim, since the extracted biomass from the partially hydrolyzed solution comprises “pentosans, hexosans and solids,” which extracted biomass is hydrolyzed to produce a hydrolyzed biomass comprising hexoses, pentoses and hydrolyzed solids.

In claim 52, line 29, the hydrolyzed biomass solution is separated into a biomass solution and solids as described in the specification as filed *inter alia* at page 18, lines 19-21.

In claim 52, line 35, a “residue fraction” is supported by the residue recited in line 24 as well as presently amended line 7.

#### Claim 56

Claim 56 has been amended to correct the spelling of “that” to “than.”

#### Claim 57

Claim 57 has been amended to delete recitation of “reduction of said hydrolyzed biomass” and “catalytic hydrogenation of said hydrolyzed biomass.”

#### Claims 58 and 59

Claims 58 and 59 have been amended to delete “e.g. NaOH.”

#### Claim 61

Claim 61 has been amended to recite “said fractionating comprises chromatographic separation; wherein said chromatographic separation is selected from the group consisting of batch separation, continuous simulated moving bed separation, and sequential simulated moving bed separation” to indicate that the chromatographic separation may be selected from the three recited chromatographic separation processes. The three recited types of chromatography are well known.<sup>1</sup> The recitation of these chromatographic separation

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<sup>1</sup> “Batch chromatography” is a classical separation process in which a column is charged with pulses of the feed solution and the components separate as the mixture travels along the column. *See* <http://www.deb.uminho.pt/escape14/KeynoteSpeakers/Engell.htm>, Engell, S. and A. Toumi “Optimization and Control of Chromatography” Abstract from ESCAPE-14: European Symposium on Computer Aided Process Engineering, May 16-19, 2004, attached hereto.

“Simulated Moving Bed” chromatography involves the use of a number of columns (usually 6-16) arranged in a close loop and a continuous separation is achieved by switching the input and output ports. *See Id.*

There are two main types of simulated moving-bed methods: the first one is a continuous process, where all flows (feed, eluent and outtake of products) are continuous; the second type is a sequential process where the flows are sequential but the concentration gradients move continuously in the columns. *See* [http://at8.abo.fi/PSE/Publ/ESCAPE-10\\_Stefan.shtml](http://at8.abo.fi/PSE/Publ/ESCAPE-10_Stefan.shtml), Karlsson, S. et al. “Optimizing the Operation of a Sequential-Simulated Moving-Bed Separation Process using MINPL” Abstract from European Symposium on Computer Aided Process Engineering ESCAPE-10, May 7-10, 2000, attached hereto.

processes which may be used for fractionating is therefore clear to one of skill in the art and does not require the recitation of steps for each process.

#### Claim 62

Claim 62 has been amended to recite “said fractionating comprises filtering; wherein said filtering is selected from the group consisting of membrane filtration, ultrafiltration, nanofiltration, and microfiltration” to indicate the types of filtration which may be selected.

#### Claim 69

Claim 69 has been amended to recite that the recited “hydrolyzing” is the hydrolyzing of the extracted biomass.

#### Claim 71

Claim 71 has been amended to insert “precipitation” and to delete “catalytic hydrogenation of said partially hydrolyzed solution” support for which may be found in the specification as filed *inter alia* at page 21, lines 3-12.

#### Claim 72

Claim 72 has been amended to recite “prior to the partial hydrolyzing of the lignocellulose-containing material in xylan-containing matter in biomass, biomass hydrolysates are obtained by direct acid hydrolysis of the biomass, prehydrolysis of the biomass with steam or acetic acid, acid hydrolysis of prehydrolysate obtained by prehydrolysis of the biomass with steam or acetic acid or a sulphite pulping process,” which to recite the production of “biomass hydrolysates” which are then present in the partially hydrolyzed solution. Support for this amendment may be found in the specification as filed *inter alia* at page 16, lines 15-19.

#### Claim 73

Claim 73 has been amended to delete “spent liquor from sa-prehydrolysis pulping,” and to add a period at the end of the claim. The recited “spent liquor from solvent-based pulping, spent liquor from phenol based pulping, spent liquor from formic acid based pulping, spent liquor from ethanol-based pulping, mother liquor from crystallization of xylose, and diluted runoff of xylitol crystallization of sulphite spent pulping liquor based fraction” all contain hydrolysates of biomass obtained by the respective processes. Such by-products contain small quantities of undissolved wood solids and soluble substances, *e.g.*, lignosulphonates, hexoses and pentoses, including xylose. *See* Specification page 11, 6-12.

The recited hydrolysates have a high xylan and/or xylose content, and therefore, may be used according to the method of claim 52.

Claim 75

The Examiner asserts that it is unclear how the numbers and/or letters after the microorganism name, other than the ATCC or NRRL numbers, define and identify the microorganisms required.

Claim 75 has been canceled without prejudice, thereby rendering moot this rejection.

Accordingly, applicants respectfully request reconsideration and withdrawal of the rejection of claims 52-79 under 35 U.S.C. §112, second paragraph.

**Claims Are Free of the Prior Art**

Applicants acknowledge the Examiner's statement that the claims are free of the prior art.

In view of the preceding amendments and remarks, it is respectfully submitted that the subject application is now in condition for allowance. A Notice of Allowance is earnestly solicited. If the Examiner has any questions or wishes to discuss this matter further, he is kindly asked to call the undersigned attorney.

Respectfully submitted,

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